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QUARTERLY BULLETIN

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BUREAU OF SUGAR EXPERIMENT STATIONS

BRISBANE QUEENSLAND

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE
CANE GROWERS'
QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

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This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XXIV. 1 January, 1961 No. 3

EDITORIAL

The Bureau is Sixty Years of Age

On December 14th, 1900, Her Majesty Queen Victoria gave royal assent to an Act of the Queensland Parliament, named "The Sugar Experiment Stations Act of 1900".

The sixtieth anniversary of that event occurred last month and we are now entering the sixty-first year of application of this far-reaching legislation.

Under the Act there was created a Bureau of Sugar Experiment Stations—an organization which has become known colloquially as the "Bureau". And under the Act was appointed a Director to control and administer such researches as might be considered desirable.

During the sixty years of the Bureau's operation there have been seven Directors who, successively, have been responsible for the development of the organization to its present standard. Within that period the size of the industry has increased tenfold, and sugar production is not only the State's largest primary industry but ranks among the important cane sugar industries of the world.

Only three other countries, Louisiana, Java and Hawaii, had sugar experiment stations earlier than Queensland, and our industry can have no regrets that it agitated so early for research into its problems; it can take pride in the sagacity and foresight of those of its pioneers who sponsored the move to create a research organization.

Dr. Walter Maxwell and the Start of the Bureau

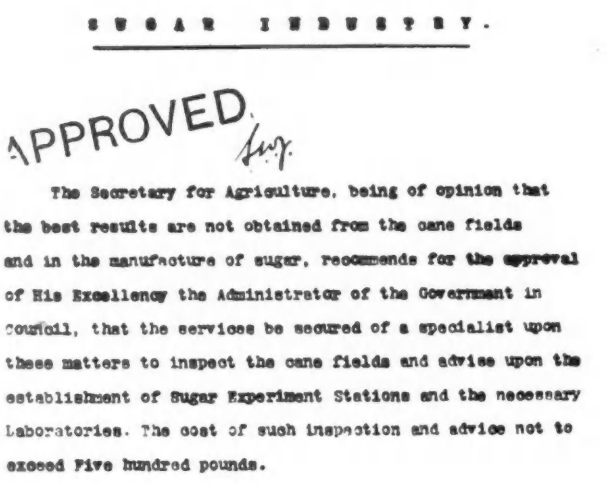
By NORMAN J. KING

As mentioned in the editorial in this issue, the Bureau completed sixty years of service to the sugar industry last month. But it was not a step which was taken suddenly by the Government of that day—sixty years ago. Many negotiations of historical interest—and of industry interest—predated that event.

As early as 1885 the then Under Secretary for Agriculture, Mr. Peter McLean, investigated the necessity for establishing experimental farms or test stations and, as a result of his enquries, he advocated two State Nurseries at The Lagoons, Mackay, and Kamerunga, Cairns, to be used for sugar cane and other tropical crops. By 1889 the Mackay nursery was established and that at Kamerunga followed it two years later.

These nurseries functioned to the advantage of the industry for several years and both the Cowley and Tryon cane collections from New Guinea were grown at and distributed from these centres. By 1894, however, the industry was dissatisfied with the nurseries because of the lack of scientific investigation into soils and cane varieties and an agitation developed for sugar experiment stations and laboratories along the lines of certain overseas sugar producing countries.

In 1898 the then Minister for Agriculture, the Hon. A. J. Thynne,



SUGAR INDUSTRY.

APPROVED.

The Secretary for Agriculture, being of opinion that the best results are not obtained from the cane fields and in the manufacture of sugar, recommends for the approval of His Excellency the Administrator of the Government in Council, that the services be secured of a specialist upon these matters to inspect the cane fields and advise upon the establishment of Sugar Experiment Stations and the necessary Laboratories. The cost of such inspection and advice not to exceed Five hundred pounds.

The Department of Agriculture to be authorised to proceed with the necessary action.

Ministers Recommend.

Fig. 37—A reproduction of the Executive Minute authorising Dr. Maxwells 'visit.

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Experiment Station and Laboratories
of the
Hawaiian Sugar Planters Association.

WALTER MAXWELL.
DIRECTOR
AND
CHIEF CHEMIST.
J. T. CRAWLEY.
FIRST ASSISTANT CHEMIST

Honolulu. H. I. Sep. 18 1899

Hon. J. B. Chataway
Secy. for Agriculture
Queensland

Dear Sir

Since my letter, dated Sep. 1, was written conditions have made it more favorable for my being able to get away for a period of say two to three months. In fact it is now practically certain that I can do so.

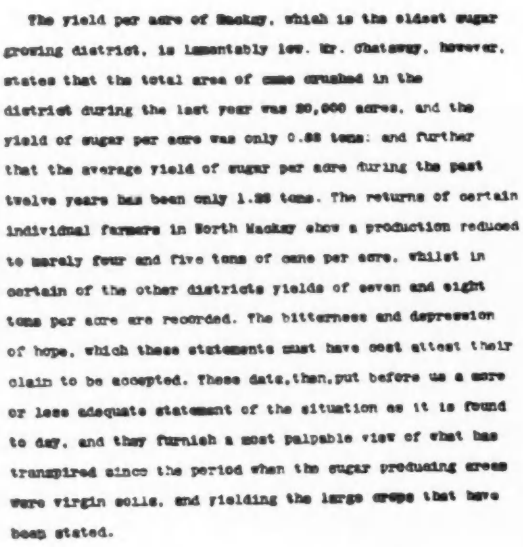
I write you immediately thus to save time, as because I can only be absent between Dec. 1 and March 1. I therefore beg to suggest [illegible], providing your people still desire me to visit them, that no time shall be lost in conveying to me your definite proposals in order that I may be able to make necessary arrangements

I am Sir,
Yours very truly
. W. Maxwell

Fig. 38—Photograph of a letter in Dr. Maxwell's handwriting accepting an offer to come to Queensland to report on the sugar industry.

agreed to the addition of a laboratory to the State Nursery at Mackay and this was erected in that year. The development appeased only temporarily the cane growers' oft-repeated requests for full-scale experiment stations and, in the next year, it was announced that the State Nursery would be done away with and the land on 9th December, 1899.

A search of old archives has disclosed some interesting historical records of Dr. Maxwell's visit. We have reproduced below a letter in Dr. Maxwell's handwriting, accepting the invitation of the Minister for Agriculture, the Hon. T. V. Chataway to come to Queensland to report on the



The yield per acre of Mackay, which is the oldest sugar growing district, is lamentably low. Mr. Chataway, however, states that the total area of cane crushed in the district during the last year was 20,000 acres, and the yield of sugar per acre was only 0.88 tons: and further that the average yield of sugar per acre during the past twelve years has been only 1.28 tons. The returns of certain individual farmers in North Mackay show a production reduced to merely four and five tons of cane per acre, whilst in certain of the other districts yields of seven and eight tons per acre are recorded. The bitterness and depression of hope, which these statements must have cost attest their claim to be accepted. These data, then, put before us a more or less adequate statement of the situation as it is found to day, and they furnish a most palpable view of what has transpired since the period when the sugar producing areas were virgin soils, and yielding the large crops that have been stated.

Fig. 39—Portion of Dr. Maxwell's report written at the end of his visit.

site used on a more satisfactory basis as a Sugar Experiment Station. At the same time sugar growers approached the Government to invite Dr. Walter Maxwell, then Director of the Experiment Station of the Hawaiian Sugar Planters' Assn. to visit Queensland to advise on the industry, the initial steps being taken by the Bundaberg Planters' and Farmers' Assn. Dr. Maxwell was accordingly invited by the Government to undertake an examination of the industry, and he arrived in Queensland on 9th December, 1899.

A search of old archives has disclosed some interesting historical records of Dr. Maxwell's visit. We have reproduced below a letter in Dr. Maxwell's handwriting, accepting the invitation of the Minister for Agriculture, the Hon. T. V. Chataway to come to Queensland to report on the sugar industry; and there is also a reproduction of the Executive Council minute which placed the official seal on the visit.

At the termination of his visit Dr. Maxwell wrote a report on his observations and findings, and it is interesting at this date—six decades later—to read what he had to say about some of our sugar crops and soils; a brief section of this typewritten report is reproduced below.

In his report Dr. Maxwell recommended to the Government that the

several sections of cane growers and manufacturers unite themselves into one body to be called "The Sugar Growers and Manufacturers Association of Queensland". The idea was, of course, based on the Hawaiian Sugar Producers' Assn., which runs the Experiment Station in that country. However the Government, in interpreting Dr. Maxwell's report, created the Bureau of Sugar Experiment Stations, and operated it as a government organisation.

Dr. Maxwell also recommended the appointment of a Director with certain specific qualifications and, in accepting this recommendation, the Government offered the position to Dr. Maxwell at a salary of £3,000 per annum—which he accepted. He took up his appointment in November, 1900, and remained as Director until March, 1909.

Claude Harding O'Brien

—Photo by courtesy Australian Sugar Journal

It is with regret that we record the death in November last of Mr. C. H. O'Brien.

Mr. O'Brien was one of the earliest members of the staff of this Bureau. He was appointed by the first Director, Dr. Maxwell, in 1901 to the position of Chemist when the Bureau opened headquarters and main laboratory at Bundaberg. Although his period of service on the Bureau staff was a short two to three years, the sixty years since that time have seen our close association with him in his many official capacities and also during his retirement.

The older members of the Bureau will remember Claude O'Brien with a great deal of affection and with appreciation of his work on sugar milling which played a major part in laying the solid foundation upon which the sugar industry of today is built.

Changing Varieties—A Section of Interest from the Bureau's Annual Report

In the portion of the Annual Report of the Bureau dealing with the activities of the Division of Plant Breeding, the Senior Plant Breeder, Mr. J. H. Buzacott, has some interesting comments on the varietal composition of the cane crop for the year 1959-1960. Since most growers are particularly interested in the performances of the old and the new, the well known and the little known varieties, a section of Mr. Buzacott's report is reproduced herewith:—

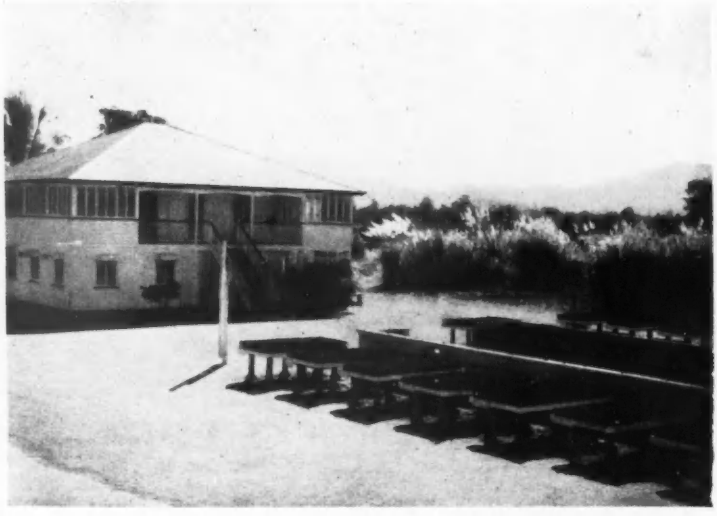


Fig. 40—The plant breeding laboratory and some of the seedling tables at Meringa Experiment Station. The arrowing canes on the right are wild varieties used in the breeding programme.

—Photo J. H. Buzacott

Varietal Statistics

The large amount of cane again left standing in Mackay in 1959, which was of the order of 800,000 tons, and much of which was Q.50, left Pindar the undisputed leading variety in the state for 1959. It has well earned that position as it is the only variety which is grown in every mill area in the state. The 1,800,000 tons of Pindar harvested constituted 22 per cent. of the total crop, a figure only slightly less than its representation in 1958. Q.50, which ranked second in importance, with one and a half million tons harvested, dropped to 18 per cent. of the total crop and it is now evident that this variety on certain soil types is being rapidly replaced by Q.58 and Q.63.

Trojan, still third-ranking variety, again yielded in excess of one million tons but three-quarters of this figure was produced in the Burdekin district, whilst north of Townsville it has lost much of its former popularity. These three varieties have occupied the three major positions, but in varying order, since 1952, a period of eight years, but they now have some strong rivals amongst the newer canes. No less than three of these in 1959 displaced the former fourth and fifth position holders, Badila and

C.P.29-116. Q.58, Q.57 and N.Co.310 in that order displaced Badila and C.P.29-116 to seventh and eighth position respectively. All three of these new varieties have obviously not yet attained their peak. Q.58 is being planted on an even wider scale in the Ingham district and it also has possibilities in the far north, in addition to the fact that it does not yet appear to have reached its peak in the Central district. Q.57, although it has suffered some recession in the Burdekin district, has become very popular in Babinda, producing 50 per cent. of the crop there, and will undoubtedly occupy a considerable portion of the Innisfail and Ingham mill areas now that it is released for growing in those districts. N.Co.310, which in recent years has been so successful in the south as an early cane, is now becoming favoured for the same purpose in the Central district, so much so that its harvest there exceeded 100,000 tons in 1959.

Q.63, in advancing from twentieth place in 1958 to ninth in 1959, is also in a position to challenge Badila and C.P.29-116, as its high sugar content has ensured it an important place in the varietal programme of the Central district for some years to come. The next two varieties Q.59 and Vidar, ranking tenth and eleventh respectively seem less likely to extend much as they are more suited to specific conditions and in fact both occupied a similar ranking in 1958.

Other varieties which have made important advances are Q.70, which improved from thirtieth place in 1958 to seventeenth in 1959, Q.68 which moved rapidly from thirty-fourth to eighteenth and Q.66 which from twenty-fifth position moved on to nineteenth. The former is a southern variety, Q.68 is a Mackay selection whilst Q.66 is the rich land variety of the far north and the three are each expected to produce in excess of 100,000 tons within the next

Fig. 41—The arrowed stalks of the male and female parents are enclosed in a cloth lantern while cross-pollination occurs. This ensures that there is no contamination by other varieties.

—Photo J. H. Buzacott

two years. Q.64 has also moved up the scale with 22,800 tons harvested in 1959 whilst Q.67 with 16,700 tons, Cadmus with 9,400 tons and Co.475 with 4,500 tons are new introductions to the harvesting list.

Co.290 and E.K.28 have now disappeared from the crushing records whilst Q.45 and Q.49 occupy the two lowest positions and appear destined soon to go.

Fig. 42—An advanced seedling (54N. 7103) from Meringa which is showing promise of producing good crops
—Photo J. H. Buzacott

Queensland-bred Canes

The percentage of the total tonnage harvested represented by Queensland-bred varieties was, at 82.8 per cent., approximately the same as in 1958. The status of importations was maintained largely by N.Co.310 which, from 4.7 per cent. of the 1958 crop, advanced to 7.3 per cent. of the 1959 crop. This helped to make up for the fall in percentage of C.P.29-116 harvested, from 5.9 to 3.6, and this variety is now well on the downgrade. Its production has fallen to some 300,000 tons whereas, as recently as 1956, its harvested crop exceeded one million tons. Badila, also, although its percentage of the state crop only fell by 0.3 per cent., was represented by 100,000 less tons in 1959 and it is slowly but steadily passing down the pathway to oblivion. Only two other foreign varieties are represented on the approved list, P.O.J.2878 and Co.475, and whilst P.O.J.2878 is gradually passing into the discard, Co.475 is a recent approval and has yet to make its mark. In fact it is doubtful whether Co.475 will ever become important since it will only be grown on poor lands in the far north. Thus, of the five imported cane varieties still grown in Queensland only N.Co.310 has prospects of retaining its position as a major variety in the state economy.

Countries of Origin of varieties forming 1959 Crop—

Country of Origin	Tons of Cane	Per Cent.
Queensland	6,961,542	82.6
South Africa	615,976	7.3
New Guinea	527,686	6.2
United States	304,642	3.6
Indonesia	13,384	0.2
India	4,501	0.1
	8,427,731	100.0

It is interesting to note that South Africa has now displaced both New Guinea and the United States in order of importance as the origin of the imported varieties grown in Queensland. However, this South African variety, N.Co.310, has achieved major successes elsewhere as it is now the most important variety in Taiwan and is rapidly becoming popular in the United States. This, in spite of the fact that in its original country it is being displaced by other varieties.

Greyback Cane Beetle

A REVIEW OF THE POSITION IN THE INNISFAIL DISTRICT AFTER TEN YEARS OF BENZENE HEXACHLORIDE USAGE

By S. O. SKINNER

So great has been the control of the grub of the greyback cane beetle that it is not surprising to find numerous growers inclining to the thought that the widespread usage of benzene hexachloride has reduced the pest to near extinction.

It is now some ten years since the full availability and adoption of the insecticide and, with the closing of the year 1960, an interesting review of the position is possible.

In the Innisfail district, as in many other northern centres, the pest appeared in a widely scattered manner during the year. There is little doubt that these simultaneous appearances were of some magnitude, held in check only by the use of BHC. As it was, severe damage with losses estimated at over 300 tons of cane were suffered by each of two Innisfail growers, while light occurrences appeared widely over the district. Of significance was the wide distribution of these infestations, not only in cane but in coastal pastures on the Palmerston Highway and at Utchee Creek, and in a block of pineapples at Kurrimine Beach. No doubt these observed instances in non-sugar cane areas were but a few of those that occurred.

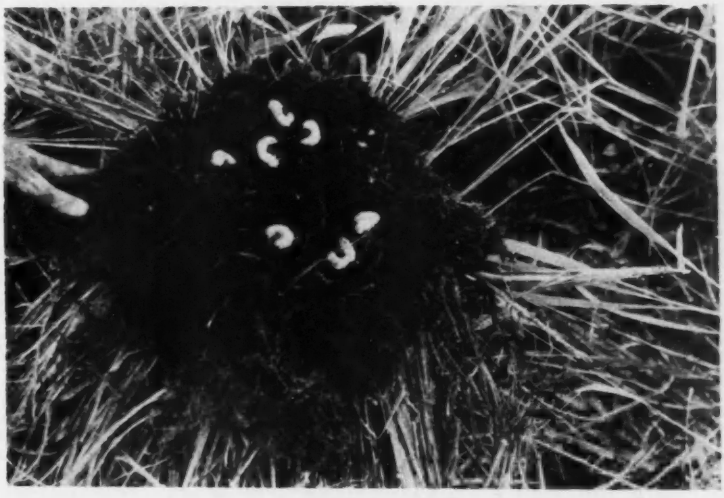


Fig. 43—Greyback cane grubs under guinea grass. The centre of an infested patch of guinea grass during 1960 covered some three acres, and was estimated to carry up to 130,000 grubs per acre.

—Photo S. O. Skinner

To appreciate the continued threat from the pest, it is necessary to recall that the insect, while commonly called the northern cane beetle, is a native of Australia. Sugar cane, of course, is not and, prior to its introduction, the grub's lot was to feed

on the roots of grasses and such herbage. With cane came the pest's opportunity to raise its standard of living—a soft cultivated soil in which to burrow, and ample roots on which to feed.

That the grub is still prospering under grass is shown in the accompanying photograph. Taken last year, this depicts a large tilted stool of guinea grass, infested by seven grubs, and completely denuded of its normal vigorous rooting system.

While the dead appearance, and manner by which the tall guinea grass could be freely lifted from the ground, were most spectacular, even more so was the number of grubs. The centre of severity of one infestation covered some three acres, and patches inspected (damage was uniform) averaged two or three grubs per square foot; this gave the startling calculated total of up to 130,000 grubs per acre. This infestation was in close proximity to cane. The recorded case in pineapples was also quite severe.

In summarising the position, it may be said:—

(a) That, as was to be expected, the greyback cane beetle is continuing to breed prolifically and, while the use of BHC has no doubt reduced populations within large centres of closely adjoining farms, the threat of a quick build-up of population is ever present. Growers close to grasslands and waste areas are particularly vulnerable to heavy infestation.

(b) Although the total loss of cane during 1960 was not great (most crops were protected by BHC), the wide appearance of the pest was noteworthy.

(c) Familiarity with BHC, and the absence of grub damage losses resulting from its application, have inclined numerous growers to become somewhat careless with the distribution of the insecticide. Speedy application with little checking of evenness of flow, placement, and cover is all too easy.

(d) It should be remembered that during the pre-BHC days, for every one obviously infested field, there were many in which *unobserved* losses of a few tons per acre occurred. Similar losses might well take place today in ratoons, even where BHC is used, if the insecticide is carelessly applied in the first instance.

The Steps of Progress

The 1959 crop was the first occasion in the history of our sugar industry that the State's average production reached 4 tons of sugar per harvested acre. A glance through Bureau records show the following as the stepping-stone years in which two, then three, now four tons per acre were reached.

1959 — 4.06 tons

1936 — 3.04 tons

1907 — 2.00 tons

1900 — 1.19 tons

A Droopy Top Trial

By L. G. VALLANCE

The cause of the very stunted growth associated with droopy top symptoms is now well known to be due to a deficiency of copper in the soil. The disease has often been described in the Quarterly Bulletin and practically all growers in the affected areas are able to recognise the characteristic symptoms and to avoid crop loss by a timely dressing of copper sulphate in combination with their fertilizer application. The normal amount used is about half a hundredweight of copper sulphate per acre. In many cases this has been cut down to 40 lb. in order to save cost and no noticeable decrease in remedial effect has been noticed.

In general, the affected area is rather small and since the above applications control the disease for several years the recommended amount is most economical. The cost when spread over a number of years is small in relation to the very large increase in yield.

However, in the Mossman district, fairly large acreages of sandy soils suffer from this deficiency and in consequence the cost of the copper application can be substantial. In order to obtain information on the possibility of reducing the application a trial was set out on a plant crop of Comus. The amounts of copper sulphate used per acre were: 56 lb., 42 lb., 28 lb., 14 lb. and nil. In addition, a treatment using 5 tons of molasses per acre was also included. All plots were otherwise fertilized uniformly.

The results of the plant crop are shown in the accompanying table.

The three highest levels of copper sulphate (28, 42, 56 lb. per acre) corrcted the deficiency equally satisfactorily and for all practical purposes there were no differences in their cane yields. The drop of half a ton to one ton per acre for the 28 lb. treatment was of no significance and was due to the normal variation which occurs in most fields of cane. Whilst it may be concluded from these figures that 28 lb. is as good as 56 lb. for the plant crop, it still remains to be seen whether the beneficial effect of the lighter dressing will carry on into the succeeding crops. This can only be determined by continuing the observations on the ratoons.

YIELDS (tons cane per acre)

Treatment (per acre)	Cane
56 lb. copper sulphate	28.9
42 lb. " "	29.4
28 lb. " "	28.4
14 lb. " "	26.4
5 tons molasses	28.4
Nil	18.3

The yield from the very light dressing of 14 lb. copper sulphate seems to suggest that it was not quite sufficient, but the difference of two to three tons per acre was not large enough to definitely prove that this was the case. However, such a drastic reduction in application would not be worth the risk from the grower's point of view.

Perhaps the most interesting feature of the trial was the response obtained to molasses. This material cured the droopy top symptoms and grew crops equal to the heaviest copper applications. The reason for this is not clear since the copper content of Mossman molasses has not yet been determined. It is, however, another instance of the remarkable value of molasses in improving soil fertility.

The Sugar Experiment Stations Acts 1900 to 1959

LIST OF VARIETIES OF SUGAR CANE APPROVED FOR PLANTING, 1961

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1961

Mossman Mill Area

Badila, Co.475, Comus, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, Q.66, S.J.4, Trojan and Vidar.

Hambledon Mill Area

Badila, Comus, Eros, Pindar, Q.50, Q.57, Q 59, Ragnar, Trojan and Co.475.

Mulgrave Mill Area

Badila, Cato, Co.475, Comus, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, Q.66, Q.67, S.J.4, and Trojan.

Babinda Mill Area

Badila, Co.475, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, Q.66, Q.67, Trojan and Vidar.

Goondi Mill Area

Badila, Castor, Pindar, Q.44, Q.57, Q.59, Q.66, Trojan, Vidar and Co.475.

South Johnstone Mill Area

Badila, Clark's Seedling, Pindar, Q.57, Q.59, Q.64, Q.66, Trojan and Vidar.

Mourilyan Mill Area

Badila, Clark's Seedling, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, Q.66, Trojan, Vidar and Co.475.

Tully Mill Area

Badila, Pindar, Q.44, Q.57, Q.59, Q.64, Q.66, Trojan and Vidar.

Victoria Mill Area

Cadmus, Damon, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, Q.50, Q.57 and Q.58.

Macknade Mill Area

Cadmus, Damon, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, Q.50, Q.57 and Q.58.

Invicta Mill Area

North of Townsville

Pindar, Q.50, Q.57, Q.58, Q.68, and Trojan.

South of Townsville

Pindar, Q.50, Q.57, Q.58, Q.63, Q.67, S.J.16, and Trojan.

Pioneer Mill Area

Badila, Comus, Pindar, Q.57, Q.67, S.J.16 and Trojan.

Kalamia Mill Area

Badila, Comus, Pindar, Q.50, Q.57, Q.67, S.J.16, and Trojan.

Inkerman Mill Area

Badila, Comus, Pindar, Q.50, Q.57, Q.67, S.J.16, and Trojan.

Proserpine Mill Area

N.Co.310, Pindar, Q.50, Q.56, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

Cattle Creek Mill Area

N.Co.310, Pindar, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

Racecourse Mill Area

N.Co.310, Pindar, Q.50, Q.56, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

Farleigh Mill Area

N.Co.310, Pindar, P.O.J.2878, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

North Eton Mill Area

N.Co.310, Pindar, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73, and Trojan.

Marian Mill Area

N.Co.310, Pindar, P.O.J.2878, Q.28, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

Pleystowe Mill Area

N.Co.310, Pindar, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73 and Trojan.

Plane Creek Mill Area

N.Co.310, Pindar, Q.50, Q.57, Q.58, Q.63, Q.65, Q.68, Q.73, and Trojan.

Qunaba Mill Area

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.58, Q.61, Q.70, and Vesta.

Millaquin Mill Area

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.55, Q.58, Q.61, Q.70 and Vesta.

Bingera Mill Area

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.55, Q.58, Q.61, Q.70 and Vesta.

Fairymead Mill Area

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.55, Q.58, Q.61, Q.70 and Vesta.

Gin Gin Mill Area

C.P.29/116, N.Co.310, Pindar, Q.47, Q.50, Q.55, Q.58, Q.61, Q.70 and Vesta.

Isis Mill Area

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.50, Q.55, Q.58, Q.61, Q.69, Q.70, Q.72 and Vesta.

Maryborough Mill Area

C.P.29/116, Pindar, Q.28, Q.47, Q.50, Q.51, Q.58, Q.61, Q.70, Q.71, N.Co.310 and Vesta.

Moreton Mill Area

C.P.29/116, N.Co.310, Pindar, Q.47, Q.50, Q.58, Q.61, Q.70, Q.71, Trojan and Vesta.

Rocky Point Mill Area

C.P.29/116, N.Co.310, Pindar, Q.50, Q.61, Trojan and Vesta.

NORMAN J. KING,
Director of Sugar Experiment Stations.

N.B.—Badila Seedling will henceforth be included in Badila.

Approved Fodder Canes

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1961

All farmers are advised that the following are the varieties of cane which may be grown for fodder purposes in the sugar mill areas as set out below:—

Mossman, Hambledon, Mulgrave, Babinda, Goondi, South Johnstone, Mourilyan, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, and Inkerman Mill Areas:

China, Uba, Co. 290, "Improved Fodder Cane", and Co. 301.

Proserpine, Cattle Creek, Racecourse, Farleigh, North Eton, Marian, Pleystowe, and Plane Creek Mill Areas:

China, Uba, "Improved Fodder Cane", and Co. 301.

Qunaba, Millaquin, Bingera, Fairymead, Gin Gin, Isis, Maryborough, Moreton and Rocky Point Mill Areas:

China, 90 Stalk, "Improved Fodder Cane", C.S.R.1 (also known as E.G.), Co.301, and Q.60.

NORMAN J. KING,
Director of Sugar Experiment Stations.

A Useful Machine for Planting Supplies

By I. T. FRESHWATER

The practice of planting "supplies" in a poorly germinated field is normally a very costly and laborious task that is undertaken with reluctance by growers. Because of the disparity in planting time between the original plant and the supplies, the return in actual cane per acre from the supplies sometimes makes the job a doubtful economical proposition. The only thing to commend supplying is that the resultant stools help provide more cover and thus minimise the growth of weeds and grasses.

A machine was designed and constructed this year by the proprietor of the South Johnstone Engineering Works with a view to taking the "back breaking" out of the supplying operation. A general view of it can be seen in the accompanying photograph.

The machine can be fitted to the three point linkage of any farm tractor. In general it resembles an ordinary drop planter, being equipped with plant carrying boxes, chute, small double-mouldboard drill plough and covering tynes. Each box is capable of holding one bag of well stacked plants, so that the machine can cover quite a considerable area before refilling under "light" supplying conditions.

The principle of operation is that the drill plough is fitted to a spring-loaded, foot-operated pedal, while the machine is maintained at a preset height on the three point linkage. As the tractor comes to a gap, the operator of the machine depresses the pedal to start the plough drilling, at the same time feeding setts down the chute to fill the gap. The setts are then covered by the tynes, and the soil lightly pressed by a metal foot attached to the lower portion of the chute. At the end of the gap, pressure on the pedal is released, enabling the plough to revert to a height where it passes over the young growing shoots.

Fig. 44—A rear view of the machine showing the sett-carrying boxes, chute and other details.
—Photo I. T. Freshwater

It is claimed that two men (the tractor driver and the operator) using this machine can supply upwards of five acres per day, which is a big improvement on the half to one acre per day for two men manually supplying under similar conditions.

Fig. 45—A 70 ton crop of Q. 57, after burning, on the Home Hill farm of Messrs. Manassero & Son.

—Photo J. H. Buzacott

Fig. 46—Bureau seedlings under trial on an Ingham Line farm (Invicta Mill Area). The development of straight and erect canes is given top priority in the breeding programme. Seedling L. 74 on left.

—Photo J. H. Buzacott

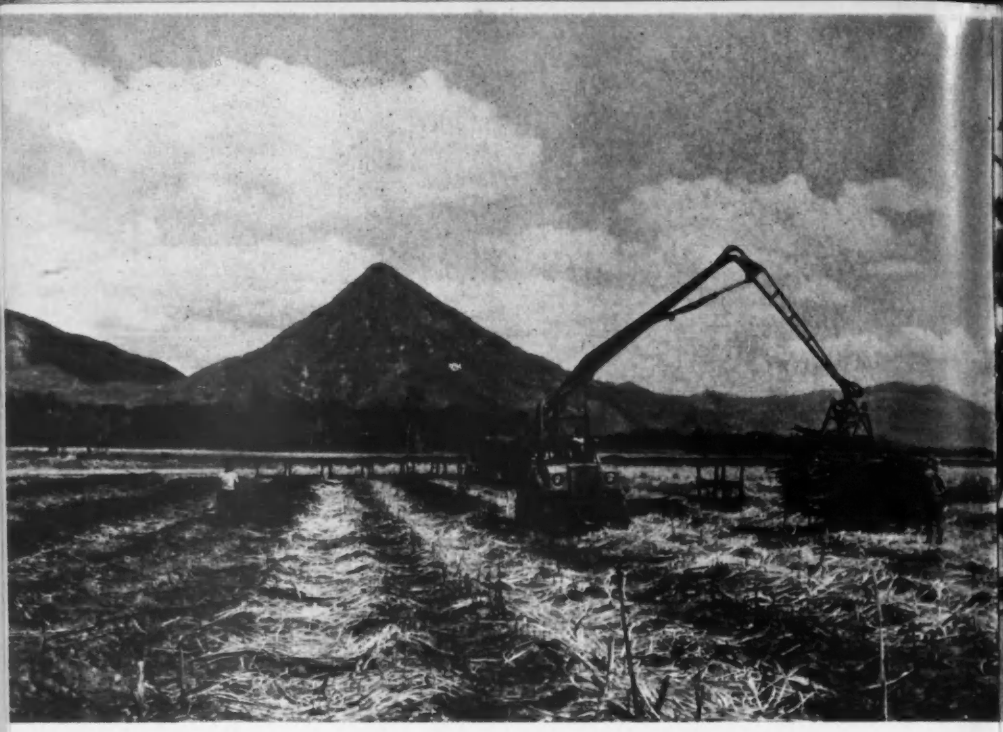
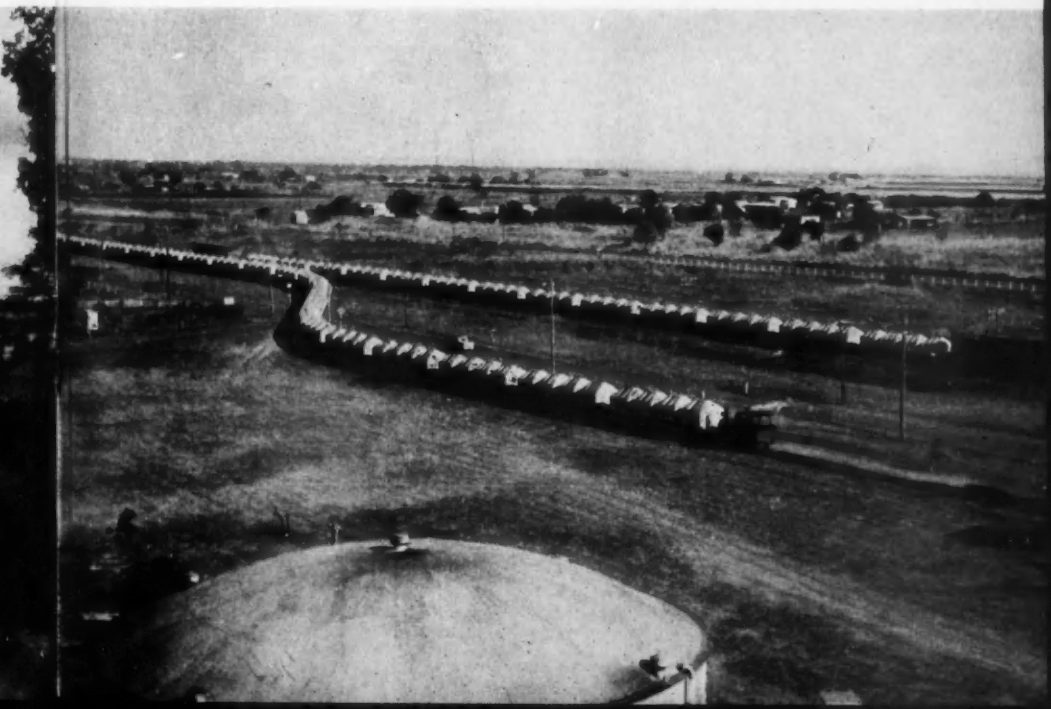


Fig. 47—Loading cane with a Toft hydraulic loader on Mr. Rossi's farm, Meerawa.
—Photo G. H. Whitaker

Fig. 48—O'Connell River farms, Proserpine district.
—Photo C. G. Hughes

Fig. 49—Triple smoke stacks of the Inkerman Mill and the bulk sugar bin and elevator.
—Photo J. H. Buzacott

Fig. 50—Shunting bulk sugar trucks at Inkerman Mill.
—Photo J. H. Buzacott



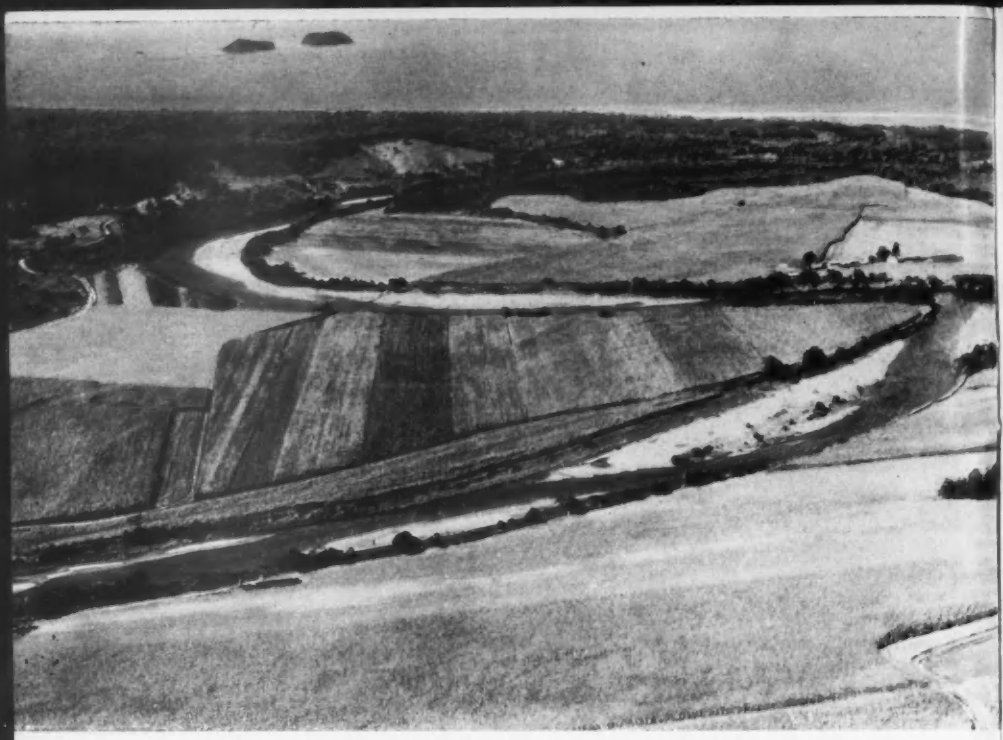


Fig. 51—Liverpool Creek and adjoining canelands south of Innisfail. The Barnard Islands in the distance.

—Photo J. H. Buzacott

Fig. 52—Canelands of Victoria mill area, Ingham district. Victoria Mill in centre and Mt. Cordelia in distance.

—Photo J. H. Buzacott

The Effect of Two Farm Peak Schemes on Farm Management in North Queensland

By A. G. BARRIE

The problem of over production that the Queensland sugar industry has been faced with during the last few years has brought various farm peak schemes into operation to distribute the mill's allocation of sugar among the growers of the district. In North Queensland there are two farm peak schemes which are encouraging two very different systems of farming. One of the peak schemes discussed in this article has a percentage of gross area as its basis, while the other has a tons of cane basis.

When any scheme to restrict production is brought into effect, the individual farmer's production (in the majority of instances) is curtailed, and consequently his income is restricted. Accordingly, the farmer will endeavour to find the best way of making his income a maximum. Since there appears to be no alternate and attractive use for his land, the cane grower's means of increasing his income are limited, almost entirely, to making as much profit as possible from sugar production, while staying within the limits imposed by the farm peak scheme.

1. PERCENTAGE AREA BASIS FOR PEAK FARM

(a) The Percentage Area Scheme

In the district which has adopted this scheme the mill estimates the percentage of gross assigned area that will be necessary to provide the mill's quota of sugar. This percentage depends on the average tons of cane per acre and the average c.c.s., for the district as a whole. The mill then accepts the cane from that percentage of each farmer's area, regardless of the type of crop on it. For instance, a farmer who produces crops at the rate of 20 tons of cane per acre has the same percentage as one who produces 40 tons of cane per acre.

(b) The Individual Farmer's Action

In an attempt to make his income a maximum while staying within the limits imposed by the percentage area scheme, the individual farmer may adopt the following procedure:—

(1) He attempts to estimate the percentage area that is likely to be accepted by the mill. This is a very difficult quantity to estimate as the season plays a very important part.

(2) He then endeavours to grow on that area the amount of cane that will give him the most profit. He realizes that if he can improve the yield by 5 to 10 tons of cane per acre his gross income will be increased by 15-30 per cent., even though the price of cane would, most likely, be lowered because of a slightly reduced c.c.s., and the cost of production increased because of increased fertilizer and, perhaps, cutting costs. This is an attractive incentive for the farmer to increase his production per acre.

(c) The Result

In the mill area where this scheme is in operation there is evidence that farmers are reducing the area under cane and increasing the production per acre. There appears to be an increase in the rate of fertilizer application and interest is being shown in other methods to increase the yield.

From data presented in the paper "Variations in the yield of farms with equal potential in the Mulgrave Area" which was presented at the 27th Conference of the Queensland Society of Sugar Cane Technologists it appears that the farmer has a great deal of influence over the tons of cane per acre, so he is likely to be successful in his attempts to raise the production per acre.

The farmer should continue to increase the application of fertilizer, labour, etc. as long as an economic margin exists between the increase in income and the increase in costs. If the farmers are successful in raising the production per acre, the area necessary to supply the mill's quota will decrease. As the area decreases, the incentive to raise production will continue and perhaps increase as the farmer's income is threatened. Hence, a "vicious circle" is set up.

(d) The Final Farming System

If such a state of affairs were to continue the outcome would be that the mill's quota of sugar would be produced on the minimum area of land. Observations in the area suggest that the farmers are growing their crops with the object of increasing cane tonnage per acre and are prepared to sacrifice a little in c.c.s. That is, they are growing the "higher tonnage-lower c.c.s. type of crop".

2. TONNAGE BASIS FOR FARM PEAK

(a) The Tonnage Scheme

In the "tons of cane" farm peak scheme each farm has, as a basis, a certain tonnage of cane. This is not an absolute figure, but varies with the average c.c.s. for the district as a whole and each farm peak is adjusted accordingly. The mill then accepts this tonnage of cane from each farm, regardless of its c.c.s. For instance, if two farmers have the same "farm peak" basis, one, who may be producing cane above the mill average, sends just as many tons of cane to the mill as the other whose cane may be below the mill average c.c.s.

(b) The Individual Farmer's Action

The farmer once again endeavours to make his income a maximum, while staying within the limits imposed by the scheme. Under this scheme the farmer is adopting the following procedure:—

(1) He attempts to estimate how many tons of cane the mill will accept from him. Generally, he takes the "gazetted" farm peak basis as the tonnage he will most probably send to the mill. Once again this is difficult to estimate because of seasonal influences.

(2) He then endeavours to grow his "peak" at the highest possible c.c.s. He realizes that if he can obtain an extra 5-10 shillings per ton for his cane his gross income will be increased by 5-10 per cent. Although this is not as great an incentive as the one offered under the percentage area scheme, it still amounts to a considerable sum of money when the peak is in the vicinity of 1000-2000 tons. It is made more attractive if he can also reduce fertilizer and cutting costs in the process.

(c) The Result

From conversation with farmers during a survey on fertilizer practice in the mill area with this scheme, it was noted that most farmers are very conscious of the quality of their cane. They realize that to gain an advantage they must produce cane which is above mill average c.c.s. In endeavouring to raise the c.c.s. of their cane they are favouring the high c.c.s. varieties and are cutting down on the quantity of fertilizer applied. They appear to be very conscious of the negative association between tons of cane per acre and c.c.s., but think that it is much closer than was indicated by results from the Mulgrave area published at the 27th Conference of the Queensland Society of Sugar Cane Technologists. In that paper it was reported that farms which were 10 tons of cane per acre above the average tended to be only one unit of c.c.s. below the average. That report also indicated that farmers do

not exercise very much control over the c.c.s. of their cane (as compared with the tons of cane per acre). Hence, it appears that the efforts of farmers to raise their c.c.s. by reducing the tons of cane per acre will meet with only partial success. Unless farmers realize this, they will endeavour to reduce the tons of cane but continue cultivating a relatively large area. As the farmers inccrease the c.c.s. the tonnage peak will fall. As the tonnage peak decreases the farmer attempts to further raise the value of each ton of cane as his income is threatened. Here also, a "vicious circle" may be set up.

(d) The Final System of Farm Management

If this "vicious circle" were to continue the outcome would be that the mill's quota of sugar would be produced with the minimum tons of cane, but a near maximum area would probably be used in growing it. The crop that is encouraged by this system is the "lower tonnage-higher c.c.s." type. Observations in the area indicate that farmers are adjusting their management to grow this type of crop.

CONCLUSION

It appears that neither of these farm peak schemes encourages a system of farm management which is ideal for the farmers of a district as a whole, in a situation where there is no alternative and attractive use for the land. In the "percentage area" farm peak scheme the "higher tonnage-lower c.c.s." type of crop grown on a minimum area is encouraged, while in the "tonnage" farm peak scheme, encouragement is given to the "lower tonnage-higher c.c.s." type of crop grown on near maximum area. The proportion of assigned land and the type of crop that would be optimum most likely varies from farm to farm and is probably somewhere between these two extremes in most instances. From the farmer's point of view an ideal farm peak system should be one which does not create a "vicious circle" when he endeavours to make his income a maximum, but one which allows him to adopt that system of farm management which is most profitable for his individual farm.

Grub Losses 1959 Crop

Because of the anticipated overproduction and a consequential desire to cut costs, a small minority of growers decided against making the usual application of BHC as a preventive against grub attack, preferring to accept the risk that their crops might not become infested. In many instances this risk was not justified and grub damage developed in widley scattered centres such as Carmila, Mackay, Ayr, Innisfail and Mulgrave districts. On a few individual farms the damage was so serious that doubts were raised as to whether the quota of cane allotted for harvest on these farms would be realized. Crop restrictions tolerated in this manner can be of little avail if the growers concerned do not succeed in producing their allotted quotas, since their shortfalls merely re-act to the advantage of other growers who have been sufficiently far-seeing to adopt the appropriate measures against pests and diseases.

It is estimated that approximately 6,000 tons of cane were destroyed by grub attack, which represents a considerable rise above the all-time low of last year. Nevertheless the impact of this on the crop as a whole was negligible. *(From the Bureau's Annual Report)*

R.W.M.

Bird Damage in Cane at Innisfail

By S. O. SKINNER

In a recent issue of the Producers' Review (September, 1960) an interesting reference was made to a unique method of frightening birds from crops by broadcasting recordings made from alarmed, captured specimens.

In the Silkwood district of the South Johnstone Mill area the problem of shining starlings exists. For some years, during the late summer months, these birds have appeared in countless numbers at dusk to alight and roost on the cane foliage. The damage caused consists of depressing and breaking the leaves of the half grown cane. The ultimate loss in crop is not necessarily great, but the damage at the time is always spectacular and the top breakage can cause a considerable amount of side shooting.

The Supervisor of the South Johnstone Cane Pest and Disease Control Board, Mr. A. R. Taylor, attempted various means of preventing the birds from settling. These included the automatic firing of a carbide gun at quick intervals, the movement by numerous personnel on a face through a field with shot guns blazing to create a high noise level, and the detonating of dynamite. Results achieved were negligible because, if and when the birds were moved on to another location, they ultimately returned to the starting point.

The accompanying photograph shows the attempt made during 1960 with loud speakers positioned overlooking a camping field. Tape recordings had previously been made of the distress call of a score or more of captured birds. The record-

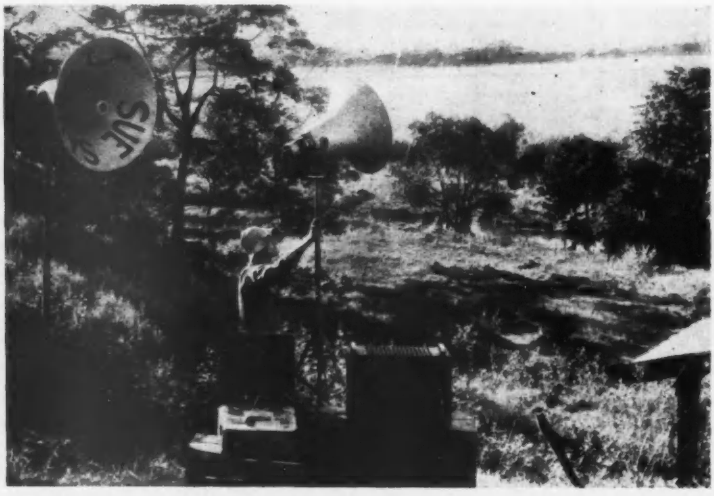


Fig. 53—Broadcasting the sounds made by captured starlings in an attempt to deter the remainder of the flock from roosting in the cane.

—photo S. O. Skinner

ing when relayed over the amplifier must have been accepted by the flocks as a lullaby for the night rather than a last lament from the few. No worthwhile results could be attributed to the method.

Reports from overseas indicate that this method has been used to some extent successfully in England, the United States of America and Holland, but it is understood that results were discouraging when tried in the dried fruit production area of Victoria.

Those Poor Patches

Varied theories are often advanced about the occurrence of poor patches in cane fields. On river flat country particularly, even though the top soil appears to be rich alluvial, poor areas will occur due to the presence of an extremely sandy subsoil.

The accompanying photograph shows the ultimate ending of such a poor patch in a cane field at Innisfail.

A few inches of top soil were cleared away and sand of good quality was uncovered. A pit was established and the poor patch was in business again—but supplying sand instead of cane. The access road which was pushed through the cane field can be seen in the upper left hand corner of the picture.

I.T.F.

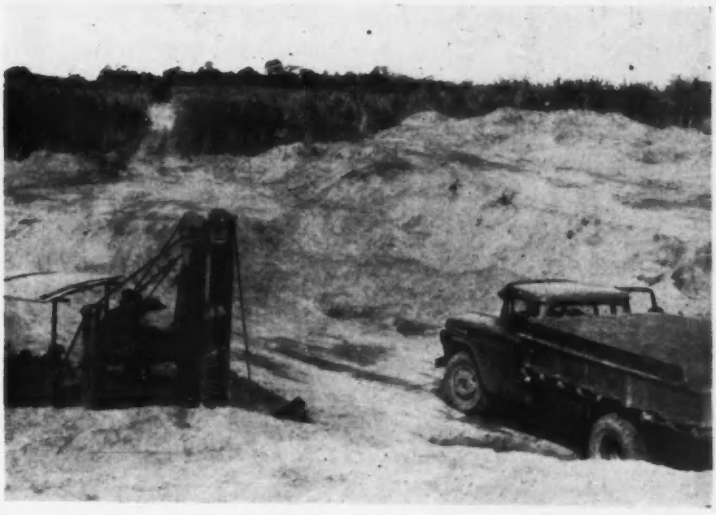


Fig. 54—A poor patch in a canefield became much more useful as a sand pit.

—Photo I. T. Freshwater

An Expanded Programme of Seedling Selection for the Southern Districts

BY H. G. KNUST

Most cane growers in the Bundaberg-Isis-Gin Gin districts usually plant during two main periods, *i.e.*, the summer-early autumn months and the spring months. The first period extends from late November in Isis to early April in Bundaberg, whilst the spring period covers from early August to late September in all districts. Planting during the winter can result in considerable loss and inconvenience since replantings following germination failures are costly and usually unsatisfactory.

Seedling raising at the Bundaberg Experiment Station for the production of new and suitable varieties for the southern districts commenced about 1930. Since then seed has been planted in the glasshouse in July each year and the subsequent selections have been propagated as spring plant in district-wide trials. However, the Bureau has always appreciated the necessity for testing a proportion of its new southern seedlings under autumn planted conditions since this is the time the major portion of these areas is planted.

Several factors, such as the necessity to avoid the hot weather months for seedling raising in the glasshouse, etc., have made it difficult to arrange for autumn planting of the new canes in the early stages of their trials. In the past, promising canes have reached practically the "approved variety" stage before any real evaluation of their performances as autumn plant was possible. In the majority of cases perhaps this did not matter a great deal but, nevertheless, there

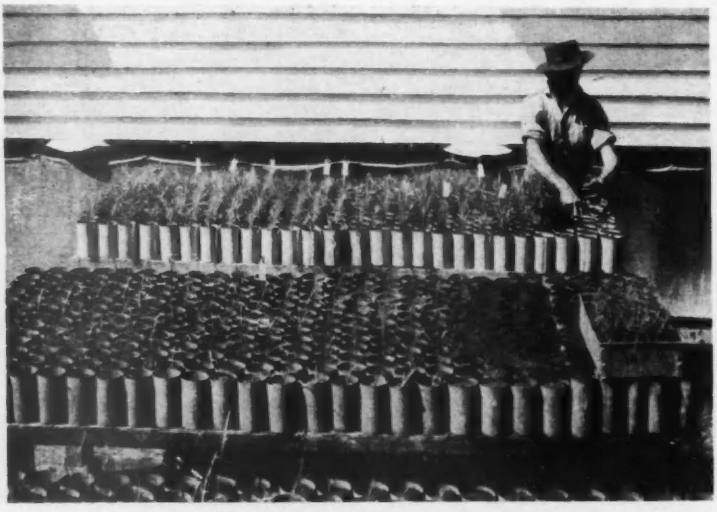


Fig. 55—Seedlings being planted in pots at Bundaberg Experiment Station. The pots in foreground contain single seedlings, whilst those at the rear are bunch planted and contain approximately ten seedlings per pot.

—Photo H. G. Knust

was always the possibility that a good cane for autumn planting might be missed because it did not behave well when planted in the spring.

Therefore it is a matter of some satisfaction to record that our seedling testing programme at the Bundaberg Station has now been expanded so that some autumn planting of seedlings will be possible. Although the main bulk of the seedling raising must still be spring plant the new procedure will allow the raising of approximately 5,000 seedlings, the selections from which will be propagated in the autumn.

It is a matter of interest that the bunch planting technique will be used in the initial stages. By this method approximately ten seedlings are planted in each seedling pot and subsequently transplanted in the field to form the equivalent of one stool. The most vigorous seedling will outgrow the weaker ones and these latter are discarded at selection time. A considerable amount of experimental work both in Queensland and overseas has shown that this method is very useful for rejecting canes that possess below average vigour. The combination of this principle with the opportunity to assess the performance of the selections under autumn planted conditions should be a useful adjunct to the varietal breeding programme for the southern districts.

The Childers Cane Grub

In South Queensland the first stage of a trial against the Childers cane grub indicated that successful control was being obtained in the plant crop in plots where gamma BHC had been broadcast and ploughed under at rates of 4 and 8 lb. per acre before planting, but little is yet known regarding the number of succeeding ratoon crops over which these dressings will remain effective. This was the only one of several trials that became infested and it emphasises the difficulty of attempting to anticipate where severe infestations are likely to develop; furthermore it highlights the doubts regarding the economic practicability of this form of control in preference to control by cultural operations. Since many of previous trials involved the variety C.P.29/116, it also reflects the value of this grub-tolerant variety which has been the mainstay of production in the Isis district for many years. Since there is a tendency to swing over to higher sucrose-yielding varieties which are more susceptible to grub damage or whose reactions to grub attack are still not fully known, it could well be that grub damage in the southern districts is likely to assume greater importance in the years immediately ahead. *(From the Bureau's Annual Report).*

R.W.M.

Eighty-Eight Years Ago

Mr. F. J. Rolleston of Eton, via Mackay, has been kind enough to let us see some letters written in 1912 by his grandfather Mr. John Rolleston for the 1912 Jubilee issue of the "Mackay Mercury". John Rolleston came to Australia from the North of Ireland in 1865 on the ship "Fiery Star". He took up land at Eton in 1881 and the farm is still in the family hands.

We have much pleasure in publishing a short extract from his memoirs which outline harvesting difficulties of a somewhat more hazardous nature than those of the present day.

"I, with my wife and family shifted there (Mackay) arriving on the 17th June, 1872.

"When I came down the sugar industry had outgrown the experimental stage and mills, such as they were in those days, were going up all around. Besides Alexandra and Meadowlands, which were the first in the district, mills had gone up or were in the course of erection at the following places: Pleystowe (Messrs. Heritt and Romily), Branscombe (Messrs. Martin and Long), Nebia (Fitzsimmons Bros.), Dumbleton (Messrs. Lloyd and Walker), Pioneer (John Spiller), Foulden (Amherst and Polkington). Donaldson Bros. had also erected a small plant at Cassada, which, by the way, turned out some of the best-grained sugar that I have ever seen. All the mills turned out marketable sugar; there was no refining in those days and some of them, especially Foulden, turned out white sugar equal to the C.S.R. Co. of today.

"The district was the scene of great activity then and for two or three years afterwards. This was not to last long, however, for two years later the rust in the cane, which rendered the crop almost valueless, threatened to extinguish the whole of the industry. Certainly it ruined many of those newly starting, especially as they had mortgaged their estates in order to erect machinery; they were completely ruined. However, a few of the plucky ones held on and imported at great cost rust-resisting varieties of cane to replace the old Bourbon variety that had been generally planted all over the district but which was almost entirely wiped out by the ravages of the rust. The indomitable pluck and energy of the planters during that crisis saved the industry for, after getting my family settled in Mackay, I looked around for something to do and hearing that John Spiller of Pioneer wanted a field overseer, I applied for and got the job and found myself in charge of 100 naked savages from every island in the Pacific. Mr. Spiller warned me that it required the utmost tact to manage them as several overseers ran away from the job. There is one incident worth relating. One day, John undertook to show the cutters a thing or two in cane cutting. Now, these same cutters, 12 in number, were as fine a specimen of the savage race as possibly could be found anywhere, strongly resented massa's interference. They let such a yell as only kanakas could fire off and went for Spiller who just managed to get on his horse and clear. My boys took up the chorus and cleared also at full speed, leaving only an old crawler or two behind. Spiller just managed to get to his house and safety; otherwise I am sure they would have killed him. They quietened down in an hour or two and my boys came back to their work as if nothing had happened."

Chlorotic Streak Disease Can Cause Poor Germinations

BY B. T. EGAN

Chlorotic streak disease is present in all the sugar growing districts of Queensland but it is mainly important in areas of high rainfall where soils are heavy and liable to waterlogging. Yield losses can be severe under these conditions and many field trials have been set out in recent years to try to determine just what these losses are. Factors responsible for the decreased yield of diseased cane include reduced rate of growth of the crop, poorer ratooning (sometimes resulting in death of badly diseased stools) and quite frequently—*poor germination.*

Most farmers realize that plants from different sources may give slightly different germinations, even if each source is healthy, so several of these trials used plants from the same source. At planting time, the diseased and healthy material was selected from the same block on the basis of whether the stools did or did not show chlorotic streak symptoms in the leaves.

In nearly every case, the healthy plots gave a faster and better germination than the diseased plots under moderately good conditions.

In one trial in the Babinda area, on heavy soil, several inches of rain fell immediatelly after the trial was planted; coupled with a spell of hot weather, this resulted in a poor germination over the whole block. The block had to be replanted but, nevertheless, even under these adverse conditions the healthy setts had germinated much better than the diseased ones. This can be seen from the percentage germination figures given below which show the very decided advantage of using healthy cane.

Variety	Healthy	Diseased
Pindar ..	69%	58%
Q.66 ..	92%	83%
Q.67 ..	83%	65%

A good stand of young plant cane provides a sound basis for future crops and every effort should be made to obtain it. By planting chlorotic streak diseased cane, the chances of a good germination are diminished from the start. Of course, there are other diseases to consider as well, and it is only by having your planting material passed as healthy by a competent inspector that you can feel assured on this point. It is therefore a wise procedure to consult your Cane Pest and Disease Control Board supervisor or the local Bureau officer well before you start planting operations.

Chlorotic Streak in the Moreton District

By C. L. TOOHEY

The past two decades of cane growing in this State have been marked by the control or virtual elimination of several major cane diseases. Gumming, downy mildew, Fiji —diseases which at one time portended hardship, if not disaster, for growers in one or more sugar producing areas — have been relegated almost to the role of museum pieces. Ratoon stunting disease has been successfully controlled by the judicious and regular introduction of hot-water treated planting material to the farm. The terrors of red rot have been allayed to a large extent by the use of resistant varieties, and intensive roguing programmes have greatly minimised losses by mosaic.

One important cane disease which remains unconquered at the present time is chlorotic streak, although increasing interest and research are being focused on it by Bureau and overseas scientists. It is true to say that diseased planting material may readily be cured by hot-water treatment at 52 degrees C. for 20 minutes. This however does not eradicate the disease since the introduction of the treated material to a disease-suspect field eventually results in a renewed infection.

Overshadowed by Fiji, which plagued the district during the late forties and early 1950's, and then by the intensive roguing campaign still under way against mosaic, chlorotic streak has recently been in the news in the Moreton district by the severity of its attacks on new and promising varieties.

Fig. 56—Closely examining leaves for symptoms in a chlorotic streak transmission trial.

All research on chlorotic streak in Queensland has suggested that the most likely method of transmission is by soil-borne water. This received strong local confirmation at the end of 1959. The comparatively dry years of 1957 and 1958 resulted in little spread of the disease, so much so that symptoms were difficult to locate at

any time. Flood rains — 27 inches between October and December, 1959 —apparently provided ideal conditions for chlorotic streak, and symptoms were noted in all wet and poorly drained sections of the district from January 1960 onwards.

Canes varied in their susceptibility to attack but the leading varieties Pindar, Q.50, and in particular N.Co. 310, were all stunted in the low areas. Most severely affected however was Q.70, a recent addition to the approved list. This variety had produced excellent stands of plant cane, but ratoons in wet spots suffered very severe stunting; so much so that in some instances no alternative was left but to plough the block out. Q.58 was also badly affected, and a small plot of the new and promising Q.63 was set back considerably.

The stunting of the stool however is not always the worst aspect of chlorotic streak. As mentioned in the case of Q.70, *plant* crops, even in the low wet spots of a field, often make apparently normal growth and symptoms may be masked even when the disease is present in a large proportion of the crop. However planting material taken from such sources rarely gives a good germination. The resultant poor strike is one of the major losses due to the disease.

Thus at the beginning of last year cane growers in the Moreton district had further warning that chlorotic streak was an opponent which merited as much respect as many of the diseases which preceded it.

Much can be done by growers themselves to combat the disease. All proposed planting material, particularly from low, wet areas, should be inspected by the Local Pest Board Supervisor or Bureau officer. However the disease symptoms, which consist of narrow creamy white to white streaks, varying in width, and extending longitudinally from the midrib of the leaf, are not always readily apparent. This is particularly the case in the early spring months when most of Moreton's planting is carried out. It is preferable therefore that planting material from such sources should be subjected to the curative hot-water treatment. In addition varieties known to be particularly sensitive to the disease should not be planted at any time in areas which past history has shown to be susceptible to chlorotic streak.

SOME FIGURES FOR THE 1959 SEASON

Total and Average Yields by Districts, 1959

Districts	Tons of Cane	Tons Cane per acre	Tons 94 N.T. Sugar per Acre
Mossman-Ingham	3,461,792	27.70	3.89
Lower Burdekin	1,206,815	31.06	4.69
Proserpine	316,946	23.33	3.34
Mackay	1,766,746	26.62	4.07
Bundaberg-Gin Gin	1,045,667	31.14	4.42
Childers-Maryborough	442,051	26.44	3.56
Nambour-Beenleigh	187,714	33.34	4.57
Whole State	8,427,731	28.12	4.06

The Mosaic Disease Campaign in the Farleigh-Habana Area of the Mackay District

By E. A. PEMBROKE

This work was carried out while Mr. Pembroke was an officer of the Mackay Cane Pest and Disease Control Board. The Bureau is indebted to the Board for the opportunity to present to growers the results of this commendable project.—Editor.

Introduction

The Farleigh-Habana area, in which an intensive campaign was carried out against mosaic disease of sugar cane, is situated north of the Pioneer River at Mackay. It extends from the sandy loam country of Eimeo and Shoal Point in the east, through the hillside country of Richmond and Habana to The Leap in the north. To the west it embraces the alluvial and old alluvial flats of Foulden and Dumbleton and the forest loams beyond Farleigh to Yakapari.

Because of the generally rugged nature of the hillside country, and the wet conditions occurring in the clay loam and gluepot soils of the flats, which comprise part of the assignments for cane growing on most of the farms in the area, it is particularly difficult to make general inspections.

Individual cane growing assignments total 277. In several instances, growers owning two or more assignments have worked them as single units for years, and to all intents and purposes they are one farm. Where the disease status of these grouped assignments is similar there has been no restriction on the assigned area from which plants could be obtained. In the case of a different disease status, the assignments have been treated separately. By this method a total of 232 separate entities was obtained. Of this total, 188 farms were recorded as having mosaic disease in hot water treated cane, prior to or during 1957, the first year of the campaign. From time to time several of the smaller growers have transferred assignments outside the campaign area. In addition, others, because of consistently late planting, have not produced acceptable planting material. After deleting these growers, a total of 177 mosaic diseased farms remained and these are discussed in this paper.

Q.50 was the major cane grown in the area for a number of years prior to, and during, the first year of operation of the campaign. The comparatively low degree of susceptibility, coupled with the tolerance of this variety to mosaic disease, has tended to minimise the seriousness of this disease in the area. Though the noble varieties grown in the earlier years of the industry have at times suffered severely from mosaic disease, crop losses of recent years have not been a cause for concern. These losses have been light in spite of the fact that the majority of the farms have mosaic disease present in one or more varieties. A further danger is the possibility of the causal virus mutating from its present mild form to a much more virulent type, as has been the experience in other countries.

Over the years the presence of mosaic disease has therefore constituted a threat to new varieties which might come into the area from time to time. The varietal position now existing emphasises this point. Since 1957, Q.50 has rapidly lost favour in the Farleigh-Habana area. It has been replaced on the stony hillsides and well drained flats by Q.58, and by Q.63 and Q.68 on the heavier and wetter soil types. Q.58 is the most widely grown of these new varieties and it has been observed that mosaic causes loss of vigour in this variety, particularly when diseased planting material is used.

These were the conditions which existed in July, 1957, when the Mackay Cane Pest and Disease Control Board in consultation with the Bureau of Sugar Experiment Stations adopted a plan of campaign which was designed to suppress mosaic disease in the area.

Procedure

The broad lines of action proposed in the campaign were—

1. To interview those growers on whose properties mosaic disease was known to exist, explain the plan of campaign to them and, with the grower, select those areas from which plants could be obtained for use in the following year.

2. To draw a rough map showing the location of the approved plant sources on each farm. A copy would be supplied to the disease inspector in order to avoid losing time by having to locate the grower on the property, or by the necessity to return at a later date if the grower was absent at the time of the first visit.

3. Growers to acknowledge their agreement with the selected areas by signing a special form.

4. To inspect the selected plant sources as soon as practicable after germination or ratooning and subsequently at intervals of six to eight weeks. Where possible, at least three inspections of each area were to be made.

5. To visit each farm again approximately two months after selection of plant sources to rectify any discrepancies due to unforeseen circumstances, or, to map any additional areas required, providing such alterations were requested before the end of December.

6. Prior to the commencement of early planting, growers to be interviewed again and reminded of their obligations. In the event of problems arising in relation to plant sources, growers were assured that the necessary attention would be forthcoming within twenty-four hours of making a request.

7. An intensive propaganda campaign to be promoted, and every opportunity taken to discuss sugar cane diseases and their control in order to increase the disease consciousness of growers.

The application of well tried and established principles in eradicating mosaic disease was the main aim of the campaign. The inspection and roguing of plant sources would cause a continual flow of disease-free planting material to be introduced into the area each year. At the same time the more heavily infected older ratoons would be removed by ploughing out in the normal farm rotation. By adopting these measures it was considered that the amount of disease present in the second ratoons of an originally disease-free planting would be reduced to a position where steps could be taken eventually to eradicate mosaic disease.

In addition to the inspection of plant sources on cane farms, the cane available for sale as plants by small crop growers at Andergrove was also inspected. This area was found to be practically free of mosaic disease and some 500 tons of cane from this source are available for plants each year. During the first year of the campaign twenty growers, whose farms were known to be heavily infected by mosaic disease, were required to introduce to their farms disease-free Q.50 from the Andergrove area. This action ensured the establishment of a nucleus of mosaic-disease-free Q.50 on these farms for future plant requirements.

The present necessity to restrict production to market requirements is also having an effect by accelerating the destruction of the older and more heavily infected ratoon crops. Blocks

which would have been grown for another year are being destroyed in the general reduction of areas of cane grown for harvest.

The campaign was commenced on 23rd July, 1957. When plant sources were being selected, no limitation, within reason, was placed on the total area selected for inspection on each farm. It was considered that to insist on too confined an area in the first year might arouse opposition. In actual fact only two growers offered serious objection and these eventually acceded to the request. As expected the growers themselves reduced the areas in subsequent years when they had become more conversant with the operation of the scheme. Total areas selected for inspection in each year were 1957, 1,134 acres, 1958, 753 acres, and 1959, 639 acres. The further drop in 1959 was accentuated by the smaller plantings planned for 1960 because of the current over-production.

The inspections were designed on a four-row basis, with an individual block inspection every six to eight weeks. This schedule was maintained during the drier spring and early summer months, but the programme was disrupted during the wet season. Any mosaic disease located in the plant source areas was rogued. It proved to be comparatively easy to detect the leaf symptoms of mosaic disease in the majority of susceptible varieties grown in the area, but Q.50 constituted a problem. In this variety leaf symptoms of mosaic disease are difficult to observe, particularly when growth conditions are adverse. Casual employees were engaged and after a short period of training assisted with the inspections. As these men did not have the experience of the permanent employees, it was decided to sacrifice speed in favour of efficiency and consequently Q.50 was inspected on a two-row basis in order to increase the accuracy of the inspections. Because of the difficulty in detecting mosaic disease symptoms in Q.50 it was decided to inspect this variety a second time, two to three weeks after the first inspection, in order to ensure elimination of the disease at the earliest possible date.

Results and Observations

Apart from the inevitable minor breaches and errors the scheme has operated smoothly and growers have kept faith with their agreements. The Board's advice was sought when a problem arose relating to plant sources, or when growers found it necessary to purchase plants. On the few occasions where release from the obligation to use planting material of a particular variety was granted, a condition of release was that substitute cane must be stripped standing before inspection. The success of this phase of the first year's campaign was revealed by the ease with which suitable plant sources were obtained the following year. It was found that many growers had selected their plant sources in anticipation of the visit of the Board's officer.

The campaign has now been in operation for two full years and the preliminary inspections have been completed on the planting material required for use in 1960. Table I shows the disease status of the inspected plant sources for the period July, 1957, to December, 1959, and clearly indicates the improvement that has occurred. The number of properties with mosaic-free planting material rose from 24 in 1957 to 145 in 1959.

Of the 177 farms comprising the campaign area three were not included in the campaign until 1958. Because of late planting in 1959 eight farms were not available for inspection at the time of writing.

Investigations made in January confirmed previous knowledge of the influence which sunlight and shadow

TABLE I—Number of farms on which the various rates of infection (number of diseased stools) were found in the fields registered as plant sources in the years 1957, 1958 and 1959.

Number of diseased stools found during year	over 200	150-199	100-149	75-99	50-74	25-49	10-24	5-9	1-4	nil
Number of farms in 1957	4	2	8	2	7	20	43	22	42	24
Number of farms in 1958	nil	nil	nil	nil	4	5	18	20	57	73
Number of farms in 1959	nil	nil	nil	nil	1	2	4	5	12	145

have on the detection of mosaic disease in Q.50. Disease symptoms were located more readily when walking away from the sun than when walking towards it. An inspection of the same rows from opposite directions showed that, with the sun in a favourable position, it is possible to detect easily stools which exhibit very early symptoms of mosaic disease. When the inspector is walking towards the sun, glancing back over the shoulder assists in locating diseased stools. Similarly when he is walking at right angles to the sun, diseased stools can be located more easily in the rows furthest from the sun. Besides being helpful in detecting mosaic disease on bright sunny days, the use of dark glasses relieves the inspector's eyes from the effects of glare.

It was further observed that the majority of second and third roguings took place in close proximity to previous roguings. This indicates that the transmission of disease from cane to cane operates about focal points of infection. Consequently a thorough roguing of diseased stools at the first inspection is very important. Under conditions of rapid growth diseased stools have been located as early as 48 hours after a previous inspection.

Inspections made over a period of twelve months in a six-acre block of Q.50 planted in April showed the expected increase in the number of stools rogued at inspections made after an increased growth rate following beneficial rains.

Depending on growth conditions, mosaic disease symptoms appear at a period of from two to four weeks after infection takes place. Dry spring conditions, a feature of Mackay weather, result in slow growth of cane with consequent slow production of new leaf. The manifestation of leaf symptoms of mosaic disease will also be slower at this time. Growth promoting rains stimulate growth of all stools in a block. Regardless of the date when any stool in the block became infected during the dry period, new leaf is made at the same time following rain. Any mosaic disease capable of manifestation will show only on this new leaf surface. The effect then is a "catching up" of diseased stools last infected at a sufficient period for disease symptoms to appear. It follows then that inspections made after the appearance of new leaf will show an increase in the number of diseased stools rogued.

Some Characteristics of the Disease

Mosaic disease is a virus disease of sugar cane with a world-wide distribution. It has been recorded in practically all sugar growing districts of Queensland, but has chiefly been confined to districts south of Townsville. In Mackay, the stronghold of the disease is in the rugged hillside country of Farleigh-Habana, though it is present in adjacent areas, and in Proserpine to the north and Plane Creek to the south.

As far as it is known, the chief insect vector in Queensland is the corn aphis (*Rhopalosiphum maidis*), though other insects could possibly be involved in the transmission of this

disease. Host plants preferred are the sorghum type grasses, *Themeda*, maize, etc. Guinea grass, which predominates in the campaign area, is not generally preferred.

The vector remains on acceptable grasses, until they die out in the dry late spring conditions. In search of food it then moves into young plant and ratoon cane but it does not colonize on cane in the field. As grasses reappear following beneficial rains, the vector tends to build up again on its natural host.

Mosaic disease has rarely been reported in grasses in this area. It would appear that the main function of grass is to act as a host plant for the vector.

Conclusions

The campaign has shown that canegrowers will co-operate in the control of disease providing constant contact is maintained with them and every opportunity taken to enlighten them on sugar cane diseases and control measures. There is little doubt that their consciousness of the importance of cane diseases in the farm economy can be increased by these contacts. It is practicable for growers to select plant source areas well in advance of requirement, and these areas will be used for plants, unless express permission is given for a change. Periodic inspection of selected areas has resulted in a substantial decrease in the number of farms on which mosaic disease has been located in designated plant sources. On the remaining farms there has been a decrease in the average number of diseased stools located per acre. This work has also led to a better understanding by growers of the importance of seeking advice in the purchase of cane plants.

Rhopalosiphum maidis, the apparent chief insect vector of mosaic disease in sugar cane in Queensland, is active in cane mostly during the late spring and early summer months, until the onset of the wet season rains. From then on there is a lessening of activity as cane becomes older, growth of grasses is prolific and insect movement is restricted by heavy rainfall.

Acknowledgements

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The officers of the Bureau of Sugar Experiment Stations have at all times supported the campaign and their guidance and assistance is hereby acknowledged.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.